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His notes and observations on botanical subjects are scattered in letters to his correspondents. Besides Botany, Meteorology is one of F.'s favorite studies, and wherever he resided, since 1849, he made daily observations with regard to it.

While at Wilmington F. published a little work entitled "The Mechanism of the Universe," and also translated Goethe's "Faust" from the German original into the English language. This translation is yet in manuscript form.

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### The Myxomycetes—their collection and preservation.

BY GEO. A. REX.

In the increasing interest manifested by American botanists in the study of mycology, the curious and anomalous Myxomycetes, or slime moulds, have not received the attention which they merit. The study of this border-land group will amply repay those who undertake it, for not only the wonderfully interesting life history and development, but the exquisite structural beauty also, of the matured sporangia of many of the orders, render them objects of peculiar interest.

The true position of the Myxomycetes is yet a disputed point with biologists, but systematic botanists will probably continue to claim them in the future, as in the past. Until the appearance of the monumental monograph of Rostafinski, the scattered and inaccessible literature, and above all the exceedingly meagre descriptions of the older botanists, rendered the determination of species almost impossible without a reference to the scattered types, which were still more inaccessible. Necessarily there was excessive reduplication of species, which is curiously illustrated in the Monograph, by the pages of synonyms of even some of the commoner species.

This difficult work of determination is now rendered easier by later and more accessible literature, especially by Cooke's translation from Rostafinski, of the British Myxomycetes, of which at least seventy-five species are also found in the United States.

It is not the intention of this paper to discuss the origin and developmental history of the plants or the plasmodium from which they are differentiated, but simply to suggest a study of interest to those whose limited time creates a necessity for specializing their work.

In the proper season in favorable locations, there may be seen ramifying on the surface of moist, decaying logs, for example, patches of a semi-fluid slime or plasmodium, varying in size and

in color from white or whitish grey to the deepest orange. If kept under observation, these masses will be found to be mobile, changing their position with a constant, ever varying current, until the conditions are favorable for the differentiation and formation of the mature plants. In some cases this maturation is accomplished with wonderful rapidity. I have seen a network of the rich yellow plasmodium of *Physarella mirabilis* covering a superficial area of two or three square feet of log surface, which developed in a single day its myriads of matured plants. The moist tan bark of the tan pits, masses of decaying leaves and herbage and decaying wood or vegetable material of any description, are the favorite places of development for the plasmodium, whence it flows over adjoining moss, leaves, growing plants and exceptionally even over moist rock and metallic objects. The vagaries of this mobile mass sometimes produce curious results. I recall an instance in which the plasmodium of *Diachea leucopoda* crept up a clump of blackberry stems to a foot in height and thence upon the radiating threads of a spider's web suspended between them, where it matured its exquisite sporangia.

With certain precautions these plants are neither difficult to collect nor preserve.

The question how and where to collect seems a simple one, and yet probably the experience of every mycologist teaches that no season or even collecting tour passes by without the acquisition of new facts in the ways and means of collecting. In this pursuit the "unexpected" is constantly occurring. Our most valued "finds" may occur in places which set our previous experience at defiance. These organisms are emphatically the creatures of warmth and moisture, and they may be found in any suitable locality which furnishes these requisites.

Generally stated, low damp copses, dense shady forests, glens in mountain forest regions, and the banks of brooks and streams are favorable collecting grounds in the proper season.

On account of the fragility of many of the species, the question of transportation and preservation is as important as that of collection. Of course many of the specimens may be wrapped in paper as other fungi, and carefully packed in the field, without destroying their scientific value, although broken by the process, but for other forms other means must be adopted.

The ingenuity of the botanist will readily suggest a safe means of transportation for the tender species, yet I may be pardoned for suggesting a simple method by which even the most fragile Cribriarías which a rude breath will crush, have safely borne the

jolting of Adirondack corduroy roads and the manipulations of the railroad baggage fiend.

For transportation I use pasteboard boxes, which may be of any convenient size (mine are  $1\frac{1}{2}$  by 3 inches), made with a deep lid and a stiff base, with simply a shoulder or shallow rim around it, high enough merely to serve as a bearing for the lid. The wood or other material bearing the specimens can be placed upon this base, held in position by light rubber bands, and the lid placed over all.

For herbarium preservation the Myxomycetes, after a thorough drying, should be placed in shallow boxes, which can then be arranged in the herbarium according to the general plan adopted by the individual botanist. Neglect of this simple precaution, originally, has caused the total loss by crushing of many of the type specimens in the Schweinitzian collection in the herbarium of the Academy of Natural Science of Philadelphia. It is also of great advantage to have these species boxes so arranged that they may be easily removed if required for study or comparison, to the stage of a microscope, where they may be examined by the aid of a condenser or a parabolic reflector. This simple method of study by reflected light not only facilitates comparison of stages of maturity and phases of variation of this very variable group, but is really essential as an aid to the determination of many species.

Few of the lower orders of plants equal these in beauty as microscopic objects, whether viewed in their entirety with the binocular or in their structural details with high powers. Some genera, as *Diachea* and *Lamproderma*, display a brilliant metallic or iridescent lustre of the sporangia walls. Others, of the *Physaraceae* are characterized either by snowy crystals or highly-colored granules, orange, scarlet, lilac, or purple, of calcium carbonate. Still others, of the *Trichiaceae* and *Arcyriaceae*, by their beautiful spore and thread-markings and sculpturing, are worthy objects for the use of the higher lenses of the microscope.

The limited areas of our country which have been subjected to mycological search have been found rich in Myxomycetes, and our list of American species can and will undoubtedly be yet enriched with both new and rare forms as the large unexplored districts are examined by students.

In Fairmount Park, Philadelphia, eighty species have been found, and each year adds to the number. This result in so comparatively limited an area, simply shows what may be done in other favorable localities with a little faithful and systematic work

According to Rostafinski (Supplement to Monograph) 229 species in all are known to science. There have been found, up to the present time, about 180 species within the limits of the United States, including a number of yet unrecorded species and omitting the uncertain or duplicated Schweinitzian species.

The physiological literature of this group has been recently enriched by "Die Pilzthiere oder Schleimpilze" of Zopf, which, with De Bary's Mycetozoa, epitomizes the latest knowledge of the subject.

For systematic study the "Monografia Sluzowce" of Rostafinski (in Polish) is exhaustive, but practically inaccessible to students in general. The ground, however, is largely covered for American students by the "Myxomycetes of Great Britain" (Cooke); the "Myxomycetes of United States" (Cooke); a list of all recorded American forms compiled from all published sources to the date of publication (Annals of New York Lyceum of Nat. Hist., 1876); the "New York State Reports" (Peck); and "Grevillea."

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#### Notes on Carex.—IV.

BY L. H. BAILEY, JR.

1. CAREX TRICHOCARPA, Muhl., Gram. 257 (1817). Culms slender, 2 or 3 feet high: leaves narrow (2 to 3 lines wide), long pointed, scabrous, the sheaths smooth: staminate spikes two or three together on a slender peduncle 2 to 5 inches long, their scales appressed, obtuse or nearly so, usually erose: pistillate spikes cylindrical (about 2 inches long and 4 or 5 lines wide), mostly loosely flowered towards the base, the lower on exserted stalks: perigynium setose-hairy, conspicuously marked with ridge-like nerves, broadly ovate at the base, tapering rather abruptly into a cylindrical beak which is tipped by nearly upright teeth a line long, twice or more the length of the ovate scale.—Moist or wet grounds throughout the Northern States east of the Mississippi. A form with nearly lanceolate perigynia and shorter spikes from New York is the var. *turbinata* of Dewey, Sill. Journ. xi. 159 (1876).

Var. IMBERBIS, Gray, Man. 5th ed. 597 (1867). Perigynium smooth, teeth usually shorter, pistillate scales longer and sheaths scabrous.—New York, *Sartwell*, to Illinois, *S. B. Mead*, *E. Hall*.

Var. DEWEYI. Staminate scales very acute, mostly loose: